Quiz

① Complete the square and find the zeros and vertex of $y = \frac{2}{2}x^2 + \frac{x}{2} - \frac{6}{2}$

$0 = x^2 + \frac{1}{2}x - 3$

2 pts $x^2 + \frac{1}{2}x = 3$

$\frac{1}{2}\left(\frac{1}{2}\right) = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$

$x^2 + \frac{1}{2}x + \frac{1}{16} = 3 + \frac{1}{16}$

$\left(x + \frac{1}{4}\right)^2 = \frac{49}{16}$

$2\left(x + \frac{1}{4}\right)^2 - 2 \cdot \frac{49}{16} = 0$

vertex $\left(-\frac{1}{4}, -\frac{49}{8}\right)$ -6.125 2 pts

zeros $\left(x + \frac{1}{4}\right)^2 = \frac{49}{16}$

$x + \frac{1}{4} = \pm\frac{7}{4}$

$x = \frac{3}{2}, -2$ 2 pts

② Find the equation for the graph

Show work/explain

$y = a(x-h)^2 + k$

$y = a(x-2)^2 - 2$

$0 = a(1-2)^2 - 2$

$0 = 1a - 2$

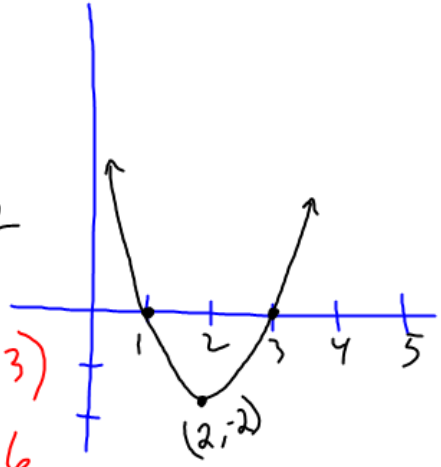
$a = 2$

Work 2 pts

$y = 2(x-2)^2 - 2$ 2 pts

$y = 2(x-1)(x-3)$

$y = 2x^2 - 8x + 6$



$x^2+2x+4 + \frac{2x-11}{x^2-2x+3}$

$$x^2-2x+3 \;\overline{)\; x^4+0x^3+3x^2+0x+1}$$

$$-\,(x^4-2x^3+3x^2)$$

$$2x^3+0x^2+0x$$

$$-\,(2x^3-4x^2+6x)$$

$$4x^2-6x+1$$

$$-\,(4x^2-8x+12)$$

$$2x-11$$

(39) $2x^3 + x^2 - 5x + 2 \quad (x+2)(x-1)$

$$\begin{array}{r|rrrr} -2 & 2 & 1 & -5 & 2 \\ & & -4 & 6 & -2 \\ \hline & 2 & -3 & 1 & 0 \end{array}$$

$2x^2 - 3x + 1$

$$\begin{array}{r|rrr} 1 & 2 & -3 & 1 \\ & & 2 & -1 \\ \hline & 2 & -1 & 0 \end{array}$$

$(2x-1) \longrightarrow (x+2)(x-1)(2x-1)$

Zeros $-2, 1, \frac{1}{2}$

(35) $x^3 - 7x + 6 \qquad x = 2$

$$\begin{array}{r|rrrr} 2 & 1 & 0 & -7 & 6 \\ & & 2 & 4 & -6 \\ \hline & 1 & 2 & -3 & 0 \end{array}$$

$(x-2)(x^2+2x-3)$

$(x-2)(x+3)(x-1)$

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(31) $4x^3 - 13x + 10$

$f(1)$

$f(1) = 1$

$$\begin{array}{r|rrrr} 1 & 4 & 0 & -13 & 10 \\ & & 4 & 4 & -9 \\ \hline & 4 & 4 & -9 & (1) \end{array}$$

$f(-2)$

$$\begin{array}{r|rrrr} -2 & 4 & 0 & -13 & 10 \\ & & -8 & 16 & -6 \\ \hline & 4 & -8 & 3 & (4) \end{array}$$

$f(-2) = 4$

$8x^4 - 14x^3 - 71x^2 - 10x + 24$

$\pm 1 \ \pm 2 \ \pm 3 \ \pm 4 \ \pm 6 \ \pm 8 \ \pm 12 \ \pm 24$

$\pm 1 \ \pm 2 \ \pm 4 \ \pm 8$

• Rational Zero Test

$\frac{\text{factors of constant}}{\text{factors of Leading coefficient}}$

1	8	-14	-71	-10	24
		8	-6	-77	-87
	8	-6	-77	-87	not zero

-1	8	-14	-71	-10	24
		-8	22	49	-39
	8	-22	-49	39	not zero

6	8	-14	-71	-10	24
		48	204	bigpos	pos
	8	34	133	pos	pos

• upper bound
if the divisor (the possible zero) is positive and all the entries are positive or zero then you have an upper bound

zero

4	8	-14	-71	-10	24
		32	72	4	-24
	8	+18	1	-6	0

$(x-4)(8x^3+18x^2+x-6)$

-4	8	18	1	-6
		-32	56	-228
	8	-14	57	-234

• Lower bound
If divisor (possible zero) is neg. and the resulting entries are alternating pos. & neg. we have a lower bound

zero

-2	8	18	1	-6
		-16	-4	6
	8	2	-3	0

$(x-4)(x+2)(8x^2+2x-3)$ (1·8, 2·-4, 1·3)

$(x-4)(x+2)(4x+3)(2x-1)$

Zeros $x = 4, -2, \frac{-3}{4}, \frac{1}{2}$

$y = 3x^3 + 2x^2 - 19x + 6$

$$\frac{\pm 1 \quad \pm 2 \quad \pm 3 \quad \pm 6}{\pm 1 \quad \pm 3}$$

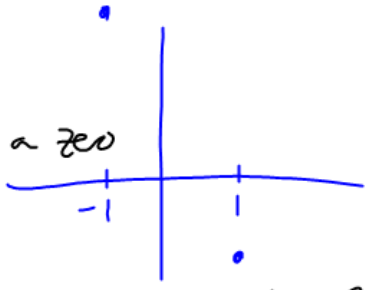
$\pm 1, \pm 2, \pm 3, \pm 6, \pm\frac{1}{3}, \pm\frac{2}{3}$

1	3	2	-19	6
		3	5	-14
	3	5	-14	(-8) neg.

-1	3	2	-19	6
		-3	1	18
	3	-1	-18	(24) pos

Intermediate Value Theorem

between a positive + neg. there is a zero



$\frac{1}{3}$	3	2	-19	6
		1	1	-6
	3	3	-18	0

$\left(x - \frac{1}{3}\right)(3x^2 + 3x - 18)$

Try 2.3

47, 49, 50, 52, 53, ~~61-66(2)~~, 68